

## **Appendix H**

### **Demonstration Program for High-Efficiency Emission Controls for Rubber-Tired Gantry Cranes, Top Picks, and Side Picks**

## **Identification and Demonstration of Emission Control Systems for Port Container Handling Equipment**

### **Background**

Cargo handling equipment at ports are a significant contributor to diesel PM exposures to nearby residents. Yard trucks, rubber tire gantry cranes, side-picks, reach stackers are examples of the types of off-road equipment used to move containerized goods. While on-road low emission technologies are available for yard trucks and it appears to be cost-effective to accelerate the fleet turnover to these technologies, there is limited information available on emission controls systems with high efficiencies for the other types of container handling equipment. This equipment typically has long lifespans, high activity rates and much higher capital costs. In addition, the new engine standards for this equipment lags behind the on-road engine standards, making an accelerated turnover approach less cost effective and highlighting the need for effective retrofit technologies.

The purpose of this project is to identify and demonstrate high efficiency retrofit emission controls that reduce diesel particulate matter and oxides of nitrogen emissions in a cost effective manner from rubber tire gantry cranes, top-picks, side-picks, and reach stackers. The project is designed to identify the most promising technologies, install these technologies in real-world applications, demonstrate the emission reduction potentials of the technologies and to provide initial data that will lead to verification under the Air Resources Board "Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines" (Verification Procedure)(Title 13, California Code of Regulations, sections 2700-2710).

The ARB will provide oversight to the study with input from a Technical Advisory Committee (TAC) comprised of representatives from the: Port of Los Angeles, Port of Long Beach, South Coast Air Quality Management District, Arco Terminal Services Corporation, and Pacific Merchant Shipping Association. The TAC will meet periodically to review data and provide comments on the port equipment selection and applicable emission reduction technologies. The interested public and stakeholders will be kept apprised through periodic updates at public workshops and outreach meetings.

The study is comprised of 5 key tasks:

- Collection Of Key Operating Parameters Necessary To Determine Emission Control System Applicability
- Solicitation Of Technology Providers
- Terminal Operator/Equipment Solicitation
- Demonstration and Emission Testing.
- Final Report

## **Task 1: Collection of Key Operating Parameters Necessary to Determine Emission Control System Applicability**

A key parameter in evaluating the applicability of many diesel exhaust retrofit devices is the exhaust temperatures over typical vehicle operations. Based on preliminary discussions with retrofit providers, this information is critical in determining whether or not their technologies may be appropriate for the application. To obtain this data, under Task 1, we will data log exhaust temperatures during typical engine operation cycles for the equipment of interest.

### Key Tasks and Considerations:

- Obtain data logging equipment (AEMC Instruments Simple Logger, Omega Type K temperature probe, and laptop computer)
- Identify desirable engine models
- Contact terminals operating RTG's, side and top picks, and reach stackers that would allow us to measure the exhaust temperature. Measure equipment operating at the Port of Oakland and the Ports of Los Angeles and/or Long Beach
- Install the temperature probes and data loggers.
- Collect data for one week and download.
- Analyze and summarize data

### TAC Input:

- Determination of the types/numbers of equipment to be data logged.
- Review data analysis.

### Implementation Timeframe:

- Fall-Winter 2005

## **Task 2: Solicitation of Technology Providers**

Under Task 2, an open solicitation of potential technology providers will be conducted. CARB will consult with the TAC on the identification of the types of control technologies that will be targeted for participation and the criteria/ranking process that will be used to select the most appropriate emission control system. During this solicitation process, the data gathered in Task 1 will be provided to all potential technology providers.

### Key Tasks and Considerations:

- Identify target cargo handling equipment and engines parameters including but not limited to equipment types, engine horsepower range, age, make, and model
- Develop criteria for desired emission control systems and technology providers including but not limited to emission control device efficiency, robustness, target pollutants, cost, ease of use, willingness to donate equipment or in-kind services, demonstrated applicability in similar off-road

applications, commitment to complete verification process. (The demonstration will fund the initial emissions baseline testing and the technology provider must pay for the post durability emission testing.)

- Develop mailing list for solicitation letter.
- Prepare solicitation letter and distribute to mailing list. Include with the solicitation letter the evaluation criteria, results from the data logging, summary of cargo handling equipment population and distribution for the targeted equipment.
- Evaluate and rank applications
- Determine budget for the study taking into consideration emission testing costs, costs for equipment and select technologies for demonstration staying within the budget constraints.
- Notify technology providers of decision.

TAC Input:

- Assist in developing criteria and weighting factors for selection of emission control systems and technology providers.
- Assist in developing mailing list.
- Evaluate and rank emission control systems submitted for consideration.

Implementation Timeframe:

- Spring 2006

**Task 3: Terminal Operation/Equipment Solicitation**

The technology providers identified in Task 2, need to use port equipment to demonstrate the emission reductions and durability of the emission control system. Under Task 3, we will solicit terminal operators for participation in the demonstration. The terminal operators' participation will require greater in-kind support for this task than in Task 1. The equipment will need to be taken out of service to conduct baseline emissions source testing, install emissions reduction equipment, and emissions source testing after the retrofit device is installed. Not only will use of the equipment be required, but also port labor may be necessary to install retrofit devices and drive the equipment.

Key Tasks and Considerations:

- Develop criteria for selection of terminal operators including but not limited to the availability of targeted equipment, willingness to provide in-kind services, willingness to assist technology provider with verification, proximity to test services and emission control system provider.
- Consult with technology providers that have been selected for participation on the criteria to ensure key elements are included.
- Prepare solicitation letter and distribute to mailing list. Include with the solicitation letter the evaluation criteria, results from the data logging, summary of cargo handling equipment population and distribution for the targeted equipment. Work with the POLA and POLB to distribute solicitation

request. As an alternative, the TAC may consider enlisting the help of the Ports to identify and solicit terminals that would be good candidates for the demonstration.

- Evaluate and rank applications according to criteria identified above. Terminals at both POLA and POLB will be selected.
- Work with terminals and technology providers to match most appropriate emissions control system with terminal equipment.

TAC Input:

- Assist with outreach to terminals.
- Develop criteria for selection of terminal operators.
- Assist with evaluation and selection of terminals for participation.
- Assist with the matching of emission control system with terminal equipment.

Implementation Timeframe:

- Spring 2006

**Task 4: Demonstration Study and Emissions Testing**

Under task 4, the actual demonstration of the emission control technology will be conducted to determine the efficiency, durability, and acceptability of the emission control system.

Key Tasks and Considerations:

- Work with the control technology provider and the terminal operator to determine if additional engine evaluation or data logging is necessary prior to installation.
- Develop emissions testing protocol and durability cycle to ensure compliance with verification procedure requirements. The test protocol will include all the necessary emission testing to support verification including but not limited to identification of the test cycle to be used during emission testing, test method, pollutants to be measured time needed for testing, who will do the emissions testing and the costs.
- Submit preliminary application for verification to ARB (responsibility of technology provider)
- Conduct baseline emissions testing according to the test protocol.
- Install emission control equipment. Ensure operating as expected.
- Conduct emissions tests after installation to determine emission reduction potential.
- Continue operation with the emission control system until durability cycle complete.
- Survey terminal operators and equipment operators on in-use experience with the control device.
- Conduct post durability emissions test. (Responsibility of the technology provider)

- Submit complete verification application to ARB. (Responsibility of technology provider)

TAC Input:

- Review test plans and provide insight on equipment operation and testing options.

Implementation Timeframe:

- Summer 2006

**Task 5: Final Report**

Under Task 5, a final report will be prepared summarizing the results from the demonstration study. The report will be shared with the TAC and be made publicly available.